



Estimated values of the saturated hydraulic conductivity of podzolic soils in the central part of the Šumava National Park – comparison of methods

Lukas Jacka, Jirka Pavlasek, and Pavel Pech

Czech University of Life Sciences Prague, Faculty of Environmental Sciences, Department of Water Resources and Environmental Modeling, Kamýcká 129, Praha 6 – Suchbát, Postcode 165 21, Czech Republic (jacka@fzp.czu.cz)

This contribution presents the evaluation of hydrogeological measurements in the mountain catchment, which is located in the central part of the Šumava National Park. Infiltration tests were made at three representative sites during summers 2008 - 2010. Methodology of the infiltration measurement was adapted using single-ring method for the difficult field conditions of heterogeneous forest soils. The value of the saturated hydraulic conductivity was estimated from steady infiltration rate. The average value estimated from 49 infiltration experiments was $4.21 \cdot 10^{-5} \text{ m} \cdot \text{s}^{-1}$. The values of percentiles 25 and 75 % were $3.79 \cdot 10^{-6}$ and $3.54 \cdot 10^{-5} \text{ m} \cdot \text{s}^{-1}$, respectively. The saturated hydraulic conductivity of chosen upper soil horizons was also determined using Guelph permeameter at two sites same as infiltration tests. The average value estimated from 53 experiments was $2.50 \cdot 10^{-5} \text{ m} \cdot \text{s}^{-1}$. The values of percentiles 25 and 75 % were $1.23 \cdot 10^{-6}$ and $8.58 \cdot 10^{-6} \text{ m} \cdot \text{s}^{-1}$, respectively. Laboratory measurements of the saturated hydraulic conductivity were carried out on 87 soil samples of volume 100 cm³ which were taken at plots of field experiments. Soil samples were analyzed in laboratory permeameter using falling head and constant head methods. The average value estimated from all tests was $1.43 \cdot 10^{-5} \text{ m} \cdot \text{s}^{-1}$. The values of percentiles 25 and 75 % were $8.95 \cdot 10^{-7}$ and $1.47 \cdot 10^{-5} \text{ m} \cdot \text{s}^{-1}$, respectively. Laboratory method showed lower values of the saturated hydraulic conductivity and higher measured range in order of magnitude in comparison with in situ methods. The average value of the saturated hydraulic conductivity estimated from the steady infiltration rate was the highest one but all methods provided approximately the same mean values.

Keywords: Bohemian Forest, soil hydrology, Guelph permeameter, infiltration, single-ring infiltrometer, podzols, small mountain catchment